

## WHAT IS CLAIMED IS:

1. A method of replacing an at least partially spent first knife, which is locked in the knife holder of a severing unit that is operative to sever smokers' products, with a second knife, comprising the steps of:
- automatically unlocking the first knife;
  - removing the first knife from the holder; and
  - introducing the second knife into the holder.

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1           2. The method of claim 1, further comprising the  
2 step of engaging the first knife prior to said removing  
3 step, said removing step including advancing the first  
4 knife along an at least substantially straight path and  
5 further comprising the step of delivering the removed  
6 first knife to and releasing the first knife at a  
7 disposing station for spent knives.

1           3. The method of claim 2, wherein said engaging  
2 step is carried out prior to said unlocking step.

1           4. The method of claim 2 of replacing a first  
2 knife having a cutting edge, wherein said removing step  
3 further includes grasping the cutting edge of the first  
4 knife.

1           5. The method of claim 1, further comprising the  
2 step of moving the first knife to a predetermined  
3 position relative to the holder subsequent to said un-  
4 locking step and prior to completion of said removing  
5 step.

1           6. The method of claim 5, wherein said removing  
2 step includes placing a withdrawing unit for the first  
3 knife opposite the first knife not later than when the  
4 first knife occupies said predetermined position.

1           7. The method of claim 1, further comprising the  
2 step of interrupting the operation of the severing unit  
3 at least in the course of said removing step.

1           8. The method of claim 7, further comprising the  
2 step of maintaining the first knife at least close to  
3 a predetermined position at the time of initiation of  
4 said removing step.

1           9. The method of claim 8, wherein said removing  
2 step includes placing a withdrawing unit for the first  
3 knife opposite the first knife not later than when the  
4 first knife occupies said predetermined position.

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1 10. The method of claim 1 of replacing a first  
2 knife which is subject to wear during operation of the  
3 severing unit, further comprising the steps of monitoring  
4 the extent of wear upon the first knife during operation  
5 of the severing unit and initiating said removing step  
6 when the wear upon the first knife reaches a predeter-  
7 mined value.

1 11. The method of claim 1, further comprising the  
2 step of automatically locking the second knife in the  
3 holder upon completion of said introducing step.

1 12. The method of claim 1, further comprising the  
2 steps of withdrawing the second knife from a storage  
3 facility for second knives and conveying the thus with-  
4 drawn second knife to a preselected position prior to  
5 said introducing step.

1 13. The method of claim 12, wherein said conveying  
2 step includes moving the second knife along an at least  
3 partially linear path.

1 14. The method of claim 12, wherein said conveying  
2 step includes moving the second knife along an at least  
3 substantially linear path.

1 15. The method of claim 12, further comprising  
2 the step of transporting the knife holder to a position  
3 opposite said preselected position of the second knife  
4 prior to said introducing step.

1 16. The method of claim 1, wherein the operation  
2 of the severing unit includes moving the knife holder  
3 and further comprising the step of interrupting the mov-  
4 ing step preparatory to and in the course of said intro-  
5 ducing step.

1 17. The method of claim 16, further comprising  
2 the steps of withdrawing the second knife from a storage  
3 facility, conveying the thus withdrawn second knife to  
4 a preselected position prior to said introducing step,  
5 and transporting the knife holder to a position opposite  
6 the second knife in the preselected position of the se-  
7 cond knife.

1 18. The method of claim 1, further comprising the  
2 step of locking the second knife in the knife holder upon  
3 completion of said introducing step.

1 19. The method of claim 1, further comprising the  
2 step of maintaining, at the time of initiation of said  
3 removing step, the knife holder at least close to a pre-  
4 determined position in which the second knife can be  
5 introduced into the knife holder upon completion of said  
6 removing step.

1 20. The method of claim 1, further comprising the  
2 step of automatically carrying out at least one of said  
3 removing and introducing steps.

1 21. The method of claim 20, wherein said step of  
2 automatically carrying out at least one of said removing  
3 and introducing steps is computerized.

1 22. The method of claim 1, further comprising the  
2 step of automatically locking the second knife in the  
3 holder upon completion of said introducing step.

1 23. The method of claim 1, further comprising the  
2 step of automatically carrying out at least one of  
3 additional steps including:  
4 engaging the first knife prior to said removing  
5 step,  
6 delivering the removed first knife to a disposing station for first knives, *claim 2*  
7  
8 moving the first knife to a predetermined position *5*  
9 relative to the holder subsequent to said unlocking step  
10 and prior to completion of said removing step,  
11 interrupting the operation of the severing unit *7*  
12 at least in the course of said removing step,  
13 maintaining the first knife at least close to a *8*  
14 predetermined position at the time of initiation of said  
15 removing step,  
16 monitoring the extent of wear upon the first knife *10*  
17 during operation of the severing unit,  
18 initiating the removing step when the wear upon *10*  
19 the first knife reaches a predetermined value,  
20 locking the second knife in the holder upon *11*  
21 completion of said introducing step,  
22 withdrawing the second knife from a storage faci- *12*  
23 lity for second knives,  
24 conveying the withdrawn second knife to a predeter- *12*  
25 mined position prior to said introducing step,

## Claim 23, cont'd.

26 transporting the knife holder to a position oppo- 15  
27 site a preselected position of the second knife prior  
28 to said introducing step, 1

29 moving the knife holder during operation of the 16  
30 severing unit,

31 interrupting the movement of the knife holder pre- 16  
32 paratory to and in the course of said introducing step,

33 and

34 maintaining - at the time of initiation of said  
35 removing step - the knife holder at least close to a 19  
36 predetermined position in which the second knife can be  
37 introduced into the knife holder upon completion of said  
38 removing step.

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1        24. Apparatus for replacing a first knife, which  
2        is locked in a knife holder of a severing unit in a  
3        machine for severing partly finished smokers' products,  
4        with a second knife, comprising:

5        disengageable means for locking the first knife  
6        in the holder;

7        means for disengaging said locking means;

8        means for removing the first knife from the holder  
9        upon disengagement of said locking means; and

10       means for introducing the second knife into the  
11       holder upon removal of the first knife prior to reengage-  
12       ment of the locking means.

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1 25. The apparatus of claim 24, wherein said  
2 locking means comprises a biasing member movable between  
3 first and second positions in which a knife is respect-  
4 ively locked in and removable from the holder, said  
5 disengaging means comprising a displacing member and  
6 means for moving said displacing member relative to the  
7 holder to thus move said biasing member from said first  
8 to said second position thereof at least during removal  
9 of the first knife from the holder.

1 26. The apparatus of claim 25, wherein said  
2 biasing member comprises at least one roller and said  
3 displacing member comprises a reciprocable bolt.

1 27. The apparatus of claim 24, wherein said remov-  
2 ing means includes means for clamping the first knife  
3 at least during removal of the first knife from the hol-  
4 der.

1 28. The apparatus of claim 24 for replacing a  
2 first knife having a cutting edge, wherein said removing  
3 means comprises means for clamping the cutting edge of  
4 the first knife during removal of the first knife from  
5 the holder.

1 29. The apparatus of claim 28, wherein said  
2 removing means further comprises means for moving said  
3 clamping means and the first knife along an at least  
4 partially linear path extending away from the holder.

1 30. The apparatus of claim 24, further comprising  
2 means for engaging said locking means upon introduction  
3 of the second knife into the holder.

1 31. The apparatus of claim 30, wherein said engag-  
2 ing means includes said disengaging means.

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1 32. The apparatus of claim 24, wherein said  
2 locking means comprises a biasing member movable between  
3 first and second positions in which a knife is respect-  
4 ively locked in and removable from the holder, and  
5 further comprising means for moving the biasing member  
6 between said positions and means for conveying the second  
7 knife into the holder in the second position of said  
8 biasing member and upon removal of the first knife from  
9 the holder.

1 33. The apparatus of claim 32, further comprising  
2 a storage facility for a supply of second knives, said  
3 conveying means being arranged to move discrete second  
4 knives seriatim from said storage facility to the holder.

1 34. The apparatus of claim 33, wherein said con-  
2 veying means comprises driven rollers arranged to advance  
3 second knives from said storage facility to the holder.

1 35. The apparatus of claim 33, wherein said storage fa-  
2 cility comprises resilient means for biasing second  
3 knives of the supply against each other.



1 37. ✓ A method of removing a knife which is locked  
2 in the knife holder of a severing unit that is operative  
3 to sever smokers' products, comprising the steps of:  
4 automatically unlocking the knife; and  
5 removing the unlocked knife from the holder.

1 38. The method of claim 37, further comprising  
2 the step of replacing the removed knife with a second  
3 knife.

1 39. The method of claim 38, wherein at least one  
2 of said removing and replacing steps includes advancing  
3 the respective knife along an at least substantially li-  
4 near path.

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1           40: A method of introducing a knife into the knife  
2 holder of a severing unit which is operative to sever  
3 smokers' products, comprising the steps of:  
4           conveying the knife into the knife holder; and  
5           automatically locking the conveyed knife in the  
6 knife holder.

1           41. The method of claim 40, further comprising  
2     the step of removing a spent knife from the holder prior  
3     to said conveying step.

1 42. / Apparatus for withdrawing an at least  
2 partially used and/or damaged knife which is lockingly  
3 engaged by the knife holder of a machine for severing  
4 partly finished smokers' products, comprising;  
5 means for terminating the locking engagement  
6 between the knife and the holder; and  
7 means for removing the knife from the knife holder  
8 upon termination of said locking engagement.

1 43. The apparatus of claim 42, further comprising  
2 means for introducing a fresh knife into the knife holder  
3 upon removal of the at least partially used and/or  
4 damaged knife.

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1 44. Apparatus for inserting a knife into the knife  
2 holder of a machine for severing partly finished smokers'  
3 products, comprising:

4 means for releasably locking knives in the holder;  
5 means for disengaging said locking means; and  
6 means for conveying discrete knives into the holder  
7 in the disengaged condition of said locking means.

1 45. The apparatus of claim 44, further comprising  
2 a source of knives, said conveying means being arranged  
3 to transport discrete knives from said source to the  
4 holder.

1 46. The apparatus of claim 44, wherein said  
2 locking means includes means for clamping knives to the  
3 holder.